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FAMILY LYCEUM.

JOSIAH HOLBROOK, EDITOR.

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VOLCANOES.

THE MOON.

IT will be necessary to say a few words by way of introduction to the account I have to give of some appearances upon the moon. The phænomena of nature, especially those that fall under the inspection of the astronomer, are to be viewed, not only with the usual attention to facts as they occur, but with the eye of reason and experience. In this we are however not allowed to depart from plain appearances; though their origin and signification should be indicated by the most characterising features. Thus, when we see, on the surface of the moon, a great number of elevations, from half a mile to a mile and a half in height, we are strictly entitled to call them mountains; but, when we attend to their particular shape, in which many of them resemble the craters of our volcanoes, and thence argue, that they owe their origin to the same cause which has modelled many of these, we may be said to see by analogy, or with the eye of reason.—Now, in this latter case, though it may be convenient, in speaking of phænomena, to use expressions that can only be justified by reasoning upon the facts themselves, it will certainly be the safest way not to neglect a full description of them, that it may appear to others how far we have been authorised to use the mental eye. This being premised, I may safely proceed to give my observations.

April 19, 1787, 10h 36m sidereal time.

I perceive three volcanoes in different places of the dark part of the new moon.—Two of them are either already nearly extinct, or otherwise in a state of going to break out; which perhaps may be decided next lunation. The third shews an actual eruption of fire, or luminous matter. I measured the distance of the crater from the northern limb of the moon, and found it 3′ 57″.3. Its light is much brighter than the nucleus of the comet which M. Mechain discovered at Paris the 10th of this month.

April 20, 1787, 10h 2m sidereal time.

The volcano burns with greater violence than last night. I believe its diameter cannot be less than 3″, by comparing it with that of the Georgian planet; as Jupiter was near at hand, I turned the telescope to his third satellite, and estimated the diameter of the burning part of the volcano to be equal to at least twice that of the satellite. Hence we may compute that the shining or burning matter must be above three miles in diameter. It is of an irregular round figure, and very sharply defined on the edges. The other two volcanoes are much farther towards the centre of the moon, and resemble large, pretty faint nebulæ, that are gradually much brighter in the middle; but no well defined luminous spot can be discerned in them.—These three spots are plainly to be distinguished from the rest of the marks upon the moon; for the reflection of the sun's rays from the earth is, in its present situation, sufficiently bright, with a ten-feet reflector, to show the moon's spots, even the darkest of them; nor did I perceive any similar phænomena last lunation, though I then viewed the same places with the same instrument.

The appearance of what I have called the actual fire or eruption of a volcano, exactly resembled a small piece of burning charcoal, when it is covered by a very thin coat of white ashes, which frequently adhere to it when it has been some time ignited; and it had a degree of brightness, about as strong as that with which such a coal would be seen to glow in faint day-light.

All the adjacent parts of the volcanic mountain seemed to be faintly illuminated by the irruption, and were gradually more obscure as they lay at a greater distance from the crater.

This eruption resembled much that which I saw on the 4th of May, in the year 1783; an account of which, with many remarkable particulars relating to volcanic mountains in the moon, I shall take an early opportunity of communicating to this Society. It differed, however, considerably in magnitude and brightness; for the volcano of the year 1783, though much brighter than that which is now burning, was not nearly so large in the dimensions of its eruption; the former seen in the telescope, resembled a star of the 4th magnitude as it appears to the natural eye: this, on the contrary, shows a visible disk of luminous matter, very different from the sparkling brightness of star-light.—[*Philosophical Transactions*, 1787.

FIXED STARS.

TWINKLING.

HAVING never yet seen any solution of the twinkling of the fixed stars, with which I could rest satisfied*, I shall offer the following, which may not perhaps be found an inadequate cause of that appearance; at least it has undoubtedly some share in producing it, especially in the smaller stars.

It is not, I think, unreasonable to suppose, that a single particle of light is sufficient to make a sensible impression upon the organs of sight. Upon this supposition, a very few particles of light, arriving at the eye in a second of time, will be sufficient to make an object visible, perhaps not more than three or four; for though the impression may be considered as momentary, yet the perception, occasioned by it, is of a much longer duration—this sufficiently appears from the well-known experiment of a lighted body whirled round in a circle, which needs not make many revolutions in a second, to appear as one continued ring of fire. Hence then it is not improbable, that the number of the particles of light, which enter the eye in a second of time even from Sirius himself, may not exceed three or four thousand; and from stars of the second magnitude, they may therefore probably not much exceed an hundred. Now the apparent increase and diminution of the light, which we observe in the twinkling of the stars, seems to be repeated at not very unequal intervals, perhaps about four or five times in a second: why may we not then suppose, that the inequalities, which will naturally arise from the chance of the rays coming sometimes a little denser and sometimes a little rarer, in so small a number of them as must fall upon the eye in the fourth or fifth part of a second, may be sufficient to account for this appearance? An addition of two or three particles of light or perhaps of a single one upon twenty, especially if there should be an equal deficiency out of the next twenty, would I suppose be very sensible; this seems at least probable from the very great difference in the appearance of stars, whose light is much less different than, I imagine, people are in general aware of; the light of the middlemost star in the tail of the Great Bear does not, I think, exceed the light of the very small star next to it, in a greater proportion than that of about sixteen or twenty to one; and M. Bouger tells us, in his *Traite d'Optique* before-mentioned, that he finds a difference in the light of objects of one part in sixty-six sufficiently distinguishable.

It will perhaps be objected, that the rays coming from Sirius are too numerous to admit of a sufficient inequality, arising from the common effect of chance, so frequently as would be necessary to produce this effect, whatever might happen in respect to the smaller stars; but till we know what inequality is necessary to produce this effect, we can only guess at it either one way or the other; there is however another circumstance, that seems to concur in the twinkling of the stars, besides their brightness, and this is a change of color. Now the red and blue rays being very much fewer, I apprehend, than those of the intermediate colors, and therefore much more liable to inequality from the common effect of chance, may help very much to account for this phenomenon, a small excess or defect in either of these making a very sensible difference in the colour.

It will now naturally be asked, why the frequency of the changes of brightness should not be often much greater, as well as sometimes less, than that above-mentioned, and why the interval of the fourth or fifth, or some such part, should be pitched upon, rather than the fortieth or fiftieth part of a second, or than a whole second, &c.; for, according to the length or shortness of the time assumed, the changes that will naturally occur, from the effect of chance, will be smaller or greater in proportion to each other. The answer to this question will, I think, tend to render the above solution more probable, as well as to throw a good deal of light upon the whole subject. The lengths of the times then between the changes of brightness, if I am not mistaken, depend upon the duration of the perception before-mentioned, occasioned by the impression of the light upon the eye, than which they seem to be neither much longer nor shorter. Whatever inequalities fall within a much shorter time than the continuance of this perception, will necessarily be blended together, and have no effect, but as they compose a part of the whole mass; but those inequalities, which fall in such a manner as that they may be assigned to intervals nearly equal to, or something greater than the continuance of this perception, will be so divided by the imagination, which will naturally follow, and pick them out as they arise.—[*Phil. Trans.* 1767.

* Some astronomers have lately adopted, as a solution of this appearance, the extreme minuteness of the apparent diameters of the fixed stars, which, they suppose, must in consequence of this be intercepted by every little mote that floats in the air; but, that an object should be able to intercept a star from us, it must be large enough to exceed the apparent diameter of the star by the diameter of the pupil of the eye; so that, if the star were a mathematical point, it must still be equal in size to the pupil of the eye.

For the Family Lyceum.

NATURAL PHENOMENA.

NUMBER, DISTANCE, AND ECONOMY OF THE STARS.

A knowledge of the fixed stars is the foundation of all astronomy. Were all the heavenly bodies in motion, like the planets, the sublime truths of astronomy had never been taught as a science. It is by comparing bodies in motion with those which are immoveable and at rest, that we determine the progress of the former; the figure and dimensions of their orbits; their periodical revolutions, and the laws which govern the planetary motions.

The first conjecture in relation to the distance of the fixed stars is, that they are all placed at an equal distance from the observer, upon the visible surface of an immense concave vault, which rests upon the circular boundary of the world, and which we call the *firmament*.

We have no means by mere ocular demonstration, of estimating their respective distances; nor has the telescope yet enabled us to arrive at any exact results on this subject, although it has revealed to us many millions of stars that are as far removed beyond those which are barely visible to the naked eye, as these are from us. The heavens become quite another spectacle—not only to the understanding, but to the senses. New worlds burst upon the sight, and old ones expand to a thousand times their former dimensions. Several of these little stars which but feebly twinkle on the unassisted eye, become immense globes, with land and water, mountains and vallies, encompassed by atmospheres, enlightened by moons, and diversified by day and night, summer and winter.

Beyond these are other suns, giving light and life to other systems, not a thousand or two thousand merely, but multiplied without end, and ranged all around us, at immense distances from each other, attended by ten thousand times ten thousand worlds, all in rapid motion; yet calm, regular, and harmonious—all space seems to be illuminated, and every particle of light a world.

It has been computed that *one hundred millions* of stars are now visible to the telescope, which cannot be discerned by the naked eye. And yet all this vast assemblage of suns and worlds may bear no greater proportion to what lies beyond the utmost boundaries of human vision, than a drop of water to the ocean; and, if stricken out of being, would be no more missed, to an eye that could take in the universe, than a fall of a leaf from a forest.

We should therefore learn, says an eminent divine of the present century*, not to look on our earth as the universe of God, but as a single insignificant atom of it—that it is only one of the many mansions which the Supreme Being has created for his worshippers; and that he may now be at work in regions more distant than geometry ever measured, creating worlds more manifold than numbers ever reckoned, displaying his goodness, and spreading over all the intimate visitations of his care.

* Dr. Chalmers.

The immense distance at which the nearest stars are known to be placed, proves that they are bodies of a prodigious size, not inferior to our sun, and that they shine, not by reflected rays, but by their own native light. It is, therefore, concluded, with good reason, that every fixed star is a sun, no less spacious than ours, surrounded by a retinue of planetary worlds, which revolve around it as a centre, and derive from it light and heat, and the agreeable vicissitudes of day and night.

These vast globes of light, then, could never have been designed merely to diversify the voids of infinite space, nor to shed a few glimmering rays on our far-distant world, for the amusement of a few astronomers, who, but for the most powerful telescopes, had never seen the thousandth part of them. We may therefore rationally conclude, that *wherever* the all-wise Creator has exerted his creative power, *there*, also he will have intelligent beings to adore his goodness.—[*Geography of the Heavens.*

SCHOOLS IN MISSISSIPPI.

A writer in the Natchez Journal calculates that there are between 7000 and 8000 children in that State, of a suitable age to attend common schools, who receive little or no education. He further states, that an entire section of the land in each township is allowed by Congress for the support of schools, and that the whole quantity of such lands in the State is about 800,000 acres, which could be sold for $2,000,000. He recommends that the sale be immediately made, with the consent of Congress, and the money invested in the Planter's Bank, where it would yield $200,000 per annum. This being done, he thinks every child in the State would be able to obtain a common school education.

CHESAPEAKE AND OHIO CANAL.

THERE are one hundred and two miles of the Canal let out, under an obligation, on the part of a selected body of contractors, to finish it by the 1st day of September next, thirty-five days before the expiration of five years from the commencement of the work—and there is no reason to believe that the work will not be completed within the stipulated period. On the contrary, such is the progress already made, and now making, towards its completion, that it is expected sixty-four and a half miles will be in use before the 1st of June next, and the residue by the 1st of September. There are 4,500 men at present on the various works, aided by the weekly consumption of 7,000 pounds of gunpowder, and the labor of 800 horses, oxen, and mules, and a full complement of wagons, carts, &c. Success to the great enterprise.

EXTRAORDINARY OAK.

PERHAPS the most magnificent oak this country ever produced was lately felled at Tolley, in Leicestershire. It will hardly be credited, but it is nevertheless true, that this tree, when cut down, covered three roods, the ground on which it fell being immediately measured. The quantity of timber, which it contained amounted to 1100 solid feet. The butt was about ten feet long, and it had five large branches, one of which contained 200 solid feet of timber. The tree when fairly butted, measured at the bottom nine feet in diameter. It produced the enormous quantity of three tons 18 cwt. of bark.—Another striking feature of this most wonderful production of nature is, the quality and beauty of the wood, which is allowed to be superior to any thing of the kind ever seen; it bears a polish equal to the finest mahogany, and the grain is of a most curious and fantastical description. Nearly the whole of the tree has been manufactured into various articles of drawing and dining room furniture, which now occupy the residence of several families of the first respectability in the neighborhood, where, when standing, it had long been an object of admiration and wonder.—[*English paper.*

THE AFRICAN GRAY PELICAN.—It is somewhat singular that the opinion of the pelican feeding its young with its blood is as general in Houssa as it is among the lower class of people in Europe; and to this belief I must acknowledge myself a proselyte! I have stood for a long while together by the side of this stupid animal, watching its motions, and seeing it bending its head for its offspring to extract their nourishment. The young ones thrust their beaks into a small aperture at the lower part of the back of the neck of their parent, and they swallow the substance that flows freely through. If it be not blood that issues from the old bird, it is a red liquid so closely resembling it, that the difference cannot be perceived. I took a sketch of the pelican feeding its young in this manner, in Houssa, which is now in my possession, and I should not have said so much on the subject, if my assertions had not been questioned by several of my countrymen.—[*Lander's Records.*

NATURAL PHILOSOPHY.

HYDRAULICS.

This branch of science is sometimes treated as forming a part of hydrostatics, but there are between the two several points in which they essentially differ; on which account we shall allot to Hydraulics a distinct chapter.

Hydraulics teach what relates to the motion of fluids, and how to determine their velocity and force. On the principles of this science all machines worked by water are constructed, as steam-engines, watermills, common and forcing pumps, syphons, fountains, and fire-extinguishing engines.

When water flows from a vessel which has a hole or aperture in the bottom, small in comparison to the width of the vessel, the water descends vertically, and the surface appears smooth, but at three or four inches from the bottom the particles turn from this direction, and proceed on all sides with a motion more or less oblique towards the aperture. The same effect takes place when water flows through an aperture laterally. The tendency of the particles towards the aperture is a necessary consequence of their perfect mobility: for they will certainly be directed towards the point where there is the least resistance, and that point is the aperture.

It is also to be observed, that in this case, at a small distance from the bottom, a kind of funnel is formed in the water, the point of which corresponds to the centre of the aperture; when, however, the water flows through a lateral orifice or aperture, there is formed only a kind of half funnel, which does not appear to commence till the surface is near touching the upper side of the hole. It is probable that the funnel begins to form itself from the first moment of the flow; but it does not become perceptible till the surface is only at a small distance from the bottom. It appears also that the funnel commences higher or lower, according to the width of the bottom; and that the formation of it is less prompt or less perceptible, according to the proportion of the aperture to the extent of the bottom. The funnel is also augmented by any roughness which may exist at the sides or bottom of the vessel.

Water flows out of a small hole in the bottom of the vessel with a velocity equal to that which a ponderous body acquires in falling from a height equal to the vertical height of the surface of the fluid above the aperture.

The same law takes place in a lateral orifice; for the pressure of the fluid is equal (at the same depth) in all directions, and consequently produces the same degree of velocity.

A fluid in running out of an aperture acquires a velocity sufficient to make it remount to a vertical height equal to that of the fluid above the aperture, in the same manner as a falling body acquires a velocity capable of making it ascend to the height from which it descended.

It is evident, from the theory of falling bodies, that if the velocity of the fluid in running through the aperture was uniformly continued, the fluid would move through a space double the height of the fluid above the aperture, in the same time that a falling body would employ in descending from that height.

The height being the same, the velocity of the fluid in running out of the orifice will always be the same, whatever the species of the fluid may be, and whatever its destiny. It is true, that when the fluid has more density it presses more forcibly, but then the mass is more considerable; and it is evident, that when the moving powers are proportioned to the masses which they put in motion, the velocities are equal.

The quantities of a fluid discharged in the same space of time through different orifices, supposing the vessels equally full during the whole of the experiment, are to each other as the products of the areas of the apertures by the square roots of the heights. It is found by experiment, that a circular orifice of an inch diameter, made in a thin vessel or partition, and under a surface of fluid four feet in height, will furnish in one minute of time, 5436 cubic inches French.—[*First Lines of Science.*

TEACHERS' MEETING.

Though we deeply regret the necessity of deferring the meeting of teachers at Andover, we hope and believe the occasion will be one of great interest and importance, to those who may attend, and to the cause of education. Those who wish to learn more particularly the objects, and plans of the society, and of the meeting, are invited to meet at the Columbian Hall in Boston, on Tuesday the 9th day of April, at 10 o'clock A. M., and at 3 P M. They can also have an opportunity at that place, and on that day to examine apparatus, and geological specimens for schools and families.

CO-OPERATION.

For the Family Lyceum.

Mr. Editor.—Your valuable paper, and pamphlets entitled Scientific Tracts, came to me in the course of mail, and I can assure you they have given me very high gratification.—Until reading your tracts, I had considered the subject of Geology as hardly worthy of attention, but I now feel differently, and for a few days have been collecting specimens, and attending to the subject with great delight. Among the reasons stated in your Tract why this subject should receive attention, you might with great propriety have added, 'it affords the best of relaxation from severe studies.' Such I have found it, and I fully believe that there would be less of dyspepsia, if our sedentary men, our clergymen especially, would spend a portion of their time in rambling the fields, surveying the pastures of the country, collecting cabinets, and so on. The study in question is important to sedentary men for the same reason that music is—it *completely*, for the time, unbends the mind, and in this way gives it just that kind of rest that students need. I am determined now to have me a cabinet. I have now lying by me seven different kinds of Quartz; different I mean in color. One week ago I did not know the difference between this mineral and Hornblende.—I have one or two specimens of Felspar, one or two of Mica, and several others of still different kinds: and as you teach the little fellows in Boston that 'it is more blessed to give than to receive,' I hope you may induce some of them to send me a few specimens, from that place which their little hands have collected, and I will promise to show them to every school in this place, and try to make little boys here feel too that they too may be blessed in doing good; and I will set little hands to work in this vicinity, in ministering in some way to human happiness: and I will try too to make their minds feel interested in learning something useful when playing in the street and when rambling in the fields. I am fully satisfied that children at an early age may learn to distinguish all the simple minerals: and I hope the time is not distant when this study will be introduced into our common schools. I have not a doubt but that children will acquire the rudiments of learning much easier and more speedily too, by having something of this kind to entertain their minds. Children have been treated as machines long enough; it is high time that they are treated as beings that have minds; and if ways can be contrived to set them to *thinking* and *judging*, and thus of making those things pleasant which we design to be useful, how much better this is than to keep on in the old-fashioned way, and try to get ideas into the head by pounding on the hand or lashing across the back. I am heartily sick of seeing children go to school till they are fifteen years old, and when they have spent all those years, not even understand the first rudiments of science. The fact is, sir, we *must* treat children as intellectual beings; we must learn them to *think;* we must entertain as well as instruct them; rather I may say, we must entertain them by our instructions; we must get out of the old beaten track, and I had almost said, we must revolutionize the whole system of common school education; but I cannot now enlarge.—I shall let you know, perhaps, hereafter, as I have leisure, what progress I make in Geology; and some few difficulties that I now have I may want you hereafter to explain in the Lyceum.

Y'rs. N.

Gilead, Conn.

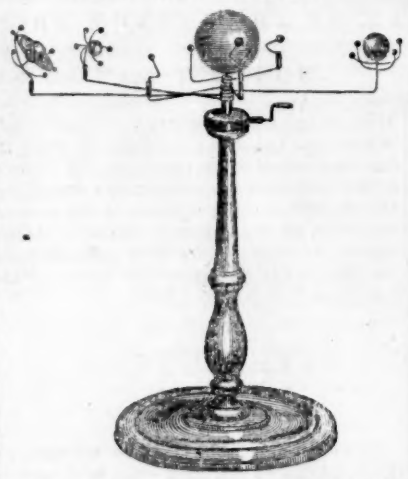
COMPARATIVE METEOROLOGY.

It is truly gratifying to witness the progress which has been made in comparing the weather at different places in our country, since the plan was first proposed in the first number of the Family Lyceum. And the circumstance which is perhaps more interesting and more promising in the case than any other, is, that Female Seminaries and other literary institutions in several different states have so far engaged in the object, as to furnish tables for the benefit of the public. From the interest this subject has excited, and from the progress it has made, we are encouraged with the belief, that within a moderate period of time, we shall be able to present a comparative view of the weather in various sections of our country for every month in the year.

A moment's examination of this subject will show, that several comparative views of the weather might be taken at different places at the same time, and of the same places at different times, which would be curious, interesting, and instructive. Suppose, for example, that the direction and force of the wind be noted at fifty different seminaries, or stations, at a given time, say at 10 o'clock on May-day, and the whole presented in a column, so that it could be compared, materials would be furnished for much speculation, and possibly for some sound theory on the subject of the weather. Or if the mean temperature for the month of May should be ascertained at Montreal, Boston, Washington, Columbus, Charleston, Savannah, N. Orleans, Andover, or any other place where there is a seminary, the whole might afford useful instruction on the *unsettled* subjects of wind and weather.

ASTRONOMY.

THE SOLAR SYSTEM.



The universe is frequently divided by astronomers into two divisions, viz. the solar system and fixed stars. About the second division little more can be said with certainty, than that 'He made the stars also.' It is however supposed, that each of the eighty millions of stars which some astronomers have calculated to exist, is a sun, which warms, enlightens, and regulates numerous bodies which surround it, as our sun imparts its genial influence, and exerts its mighty power, upon the planets, moons, comets, asteroids, and all other bodies, to which it gives motion, and animation, and beauty. This is indeed a mighty thought, and generally supposed to be true, though it wants that demonstration which attends very many most interesting truths respecting that division of which our earth forms a part.

The solar system, which comprehends the sun and all the bodies it warms, enlightens, and animates, is, to us, the most interesting division of our Creator's vast universe. About these, many facts are proved by the light of demonstration. We can count their number, measure their diameter, calculate their motions, determine their distances, and predict various phænomena and changes to which they are exposed.

The various bodies which compose this system, may be naturally and conveniently arranged into six different orders or classes. These are, first, the sun; second, planets; third, asteroids; fourth, moons; fifth, comets; and sixth, meteors. The three first classes are represented in the cut above, by which it will be seen, that the number of bodies in these classes is twenty-six, viz.: the sun, seven planets, and eighteen moons, which belong to the Earth, Jupiter, Saturn, and Herschel; the Earth having one, Jupiter four, Saturn seven, and Herschel six, as will be seen by the print, but more clearly by the orrery which it represents.

Notwithstanding the number, operations, changes, and various phænomena, which give so much beauty and grandeur to this system, the laws which regulate them, and preserve the utmost order and harmony among the whole, are few and simple.—The great and governing law which applies equally to every body and every particle of matter in each, is gravitation. As the sun is more than a million times as large as the earth, and immensely larger than the whole of the system besides, the mighty power of gravitation in that, is sufficient to give motion and preserve order among the planets, with their attendant moons, and the various other bodies subject to the same influence.

Though the sun exerts an attraction upon all the bodies which surround it, its greatest force is upon the one nearest. Among the planets, Mercury is the nearest, and of course is drawn with a far greater force, and receives more rapid motion than any other. This planet, from the great rapidity of its motion, and the comparatively short distance of its annual course, completes its year in a little less than three of our months. Venus, which next to Mercury is nearest the sun, and of course has the greatest motion, completes a year or performs a revolution round the sun in about seven months, the Earth in twelve months, Mars in nearly two years, Jupiter in a little more than twelve years, Saturn in thirty, and Herschel in eighty-three.

The same law prevails among the moons; that nearest any given planet moving with greater velocity, and performing a quicker revolution, than any other; and the others in order. Comets, asteroids, meteors, and every other body, and every particle of matter, both in the heavens and upon the earth, yield constant and implicit obedience to the same great but simple law of the Creator. But more in the next number.

POLITICAL ECONOMY.

SCHOOL LYCEUMS.

A juvenile society, consisting of the pupils of one school, have done more in three weeks to bring into operation the sound and well-acknowledged principles of political economy, than has been done by the angry discussions on this complicated but interesting science, carried on in Congress for two years. The measure adopted and executed by this juvenile band, which has only occupied their pastime for two or three weeks, can hardly fail to produce a salutary influence upon one hundred thousand minds, and probably three times that number, the present season, and must eventually have a bearing and an important influence upon our whole nation.

And we ask our readers, not to declare that these assertions are extravagant and wild, until they have examined them one moment at least, or until they see the bearing and natural consequences of the measure referred to.

What we refer to in the above assertions, is the donation of three hundred sets of geological specimens presented to the schools of each town in the state of Massachusetts, by a School Lyceum in Boston. It will be easy for the teachers and other friends of these schools, to make such arrangements as to have every school and almost every child benefitted by them. An impulse and an interest may be created, not only in every school, but in the mind of nearly every child; and this interest will not be confined to geology or to natural history, but it will extend to other subjects and all subjects, pursued by these children.

Nor will this interest be confined to children; it will extend to their parents and other friends. And as nearly two hundred thousand children will probably attend school in Massachusetts during the coming season, it is safe to calculate, that one hundred thousand of these will be more or less influenced by the donation referred to, and that they will exert more or less influence upon as many others.

Nor will these results be confined to a temporary feeling, or the present season.—They will be embodied in the solid materials of granite, slate, soapstone, and the precious minerals. Many, and probably most of these schools, will commence their cabinets. They will explore the riches of the mineral kingdom around them. They will discover many valuable deposits, which the farmer and mechanic may apply to give a richer reward to their labors; and while they increase the rewards of the husbandman, they will enrich the treasures of science.

Nor will the effects of this juvenile benevolence be confined to the commonwealth of Massachusetts. The young philosophers and patriots of other states will quickly follow their examples, and furnish their school-rooms with specimens of the works of their Creator, and wisely appropriate his goodness for the benefit of themselves, the advancement of science, and the increase of national wealth and prosperity. This is what we call political economy—*great effects from little causes.*

FAMILY INSTRUCTION.

GEOGRAPHY.

Few if any subjects are more appropriate as branches of early instruction, both in the school and family, than geography. By the aid of a globe, and maps, which are to this subject what pictures of animals are to Natural History, children from two to five years of age, may be amused and instructed, by seeing the situation of countries, the direction of rivers, and other departments of this useful science.

Whoever will examine the relations and bearing of conversation, in any intelligent family an hour, will be likely to observe some remarks which would call geography into use. This is well illustrated in the inquiry of a little girl of three years old, when she was told that her father had gone to New Bedford. 'Where is my map mother? I want to see where New Bedford is.' We are probably not aware without a moment's reflection, how much of our conversation is of such a character as would be rendered more intelligible, and of course more interesting and useful to children, if they had some knowledge of geography.

Under these impressions, a small globe and several maps are selected as a part of the family apparatus which is extending so rapidly over the country. By the instruments here provided children will never fail to learn more in a few weeks respecting the relative situation of places, and the subjects and nature of geography generally, than they usually learn in as many years.

EDUCATION.

SCHOOL FOR THE BLIND.

NOTHING has probably heretofore done so much for the cause of general education as the experiments made in deaf and dumb asylums. The situation of the pupils in these schools rendered it necessary that their teachers should resort to the principles of mind and heart, for the purpose of acting on mind and heart. They found it impossible to proceed in direct opposition to the established and uniform laws of nature, as is the case with pupils in possession of all their senses.

These experiments, which arose partly from necessity, and partly from a more minute attention brought upon the subject of mind, and of operating on mind from other causes, led to most important discoveries in the science of intellectual philosophy.—So that institutions which were established in behalf of a very small portion of the community, have conferred blessings of the highest value upon the whole human family.

Similar results are now promised by schools for the blind. A six months experiment of the school for the blind in Boston, has already furnished a lesson to parents and teachers, which they ought to improve for the benefit of their children and pupils. The children in this school have actually learnt more in six months, than any of the children in our public schools learn in four years, and more than most of them learn in six years. Children, of six and eight years old, have made great progress in reading, spelling, geography, and arithmetic, while little if any thing is attempted in our primary schools but reading and spelling, and no great progress is made in them.—This fact is of itself sufficient to prove that some radical defects exist in common schools which call for a speedy remedy.

This most interesting and important fact does not prove that children can learn more without eyes than with, but that the modes usually adopted in acting upon the mind through the medium of the eye, are unnatural, and of course abortive. The great point is to have such subjects presented, and presented in such a way, that they will bring the mind into action, which is seldom done in the ordinary modes of teaching.—The *signs* of ideas, and not ideas themselves, usually occupy all the attention of teachers in the instruction of their pupils. How many ideas are presented to the minds of children by their spelling-books, which frequently occupy two or three years of their life? The number must certainly be exceedingly small; not as many, probably, as they might get from other sources in two or three hours.

If these are facts, what teacher, what parent, what citizen, is not interested in effecting a speedy improvement in our schools? Is it doing justice to the child to keep him confined for several years to what he might learn in a few hours? Is it doing justice to the community, or to the world? Does the case not call upon every member of society to render his aid in effecting a speedy revolution? And who is not ready to render it?

AMERICAN LYCEUM.

CABINETS OF NATURAL HISTORY.

AT the last anniversary of the National Lyceum, a resolution was passed recommending the general co-operation of the friends of education in all parts of the country, in collecting cabinets of Natural History. The executive committee of this society have recently issued a circular, inviting collections to be forwarded to New York, in behalf of the institution, for the purpose of instituting a general system of exchanges through the states. We hope that delegates who attend the third anniversary of the society from various parts of the country, on the third of May next, will accept of this invitation and take with them specimens of this production of nature in their several vicinities, as the commencement of a National Cabinet of Natural History.

Much progress is already made in most of the states, towards entering upon this national enterprise. Numerous and valuable collections now exist, in most of which there are duplicates which might well be appropriated to the proposed object. The distinguished act of generosity, by the Bowdoin Hall School Lyceum, in presenting to the schools of every town in the state of Massachusetts a set of geological specimens, will do much to forward the object proposed by this society. If all other schools throughout the country should go and do likewise, a National cabinet, and a cabinet in every town and village in the nation, might be provided in a single year.

SCHOOL AGENT SOCIETY.

CONVENTION OF TEACHERS AT ANDOVER, APRIL 10TH.

THE Lectures proposed to be given, are expected from the gentlemen whose names are attached to the subjects specified.

1. An Introductory Lecture.

2. *Three* Lectures on the condition, wants, and means of benefiting those parts of our country, suffering under a deprivation of schools, especially at the West and South. Mr. HENRY SMITH, *Ohio.*

3. *Two* Lectures on Weekly, or Circuit Schools. (1) Their necessity and practicability. (2) Mode of conducting them.
Mr. F. A. BARTON, *Inst'r. in Sem. for Teachers.*

4. *Five* Lectures on the Art of Teaching. (1) Responsibility of Instructers. (2) Qualifications, natural and acquired. (3) Manner of commencing a School. (4) Objects for which the Teacher ought to labor. (5) Mode of Teaching.
Mr. HALL, *Principal of Sem. for Teachers.*

5. *Two* Lectures on Apparatus. (1.) The necessity of Apparatus. (2) Mode of most successfully employing it. Mr. J. HOLBROOK, *Boston.*

6. *Three* Lectures on the importance of Common Schools; the qualifications of Teachers; their trials, difficulties, and obstacles, and also the means of overcoming them.
Mr. ADAMS, *Late Prin. of P. Academy, Andover.*

7. *Two* Lectures on Geology. (1) Geology considered as a science. (2) Its uses, and the manner of studying it, (illustrated by specimens, drawings, geological maps, &c.)
Mr. HIBBARD, *of Theo. Seminary, Andover.*

8. *Two* Lectures on Chemistry. (1) Chemistry as a practical science. (2) Mode of treating and manner of studying it, (with experiments.)
Mr. HIBBARD, *of Theo. Seminary, Andover.*

9. *One* Lecture on Moral Education.
Mr. JOHNSON, *Prin. of P. Academy, Andover.*

10. *One* Lecture on the Carstairian System of Writing. Mr. T. D. SMITH, *Inst. in Teachers' Sem.*

11. *One* Lecture on Electricity, (with experiments.) Mr. ——.

12. *One* Lecture on Natural Philosophy, (with experiments.) Mr. LAMSON, *Prin. Fem. Sem. Andover.*

13. *One* Lecture on Natural History, (with specimens.) Mr. TAYLOR, *Theo. Sem.*

14. *One* Lecture on Manual Labor, connected with schools. Mr. HENRY SMITH, *Ohio.*

15. *One* Lecture on Teaching Arithmetic.
Mr. TENNEY, *Inst. in Teachers' Seminary.*

Lectures *may* be given on some other subjects, if it is deemed desirable at the time.

Daily Meetings will be held, for the purpose of discussion and inquiry, conducted principally by the members of the Convention. Opportunities will be furnished for witnessing exercises in the schools.

Persons who desire it, will have the opportunity of becoming members of the AMERICAN SCHOOL AGENT SOCIETY; and, at the close of the exercises, those can receive testimonials from the Executive Committee, who in their opinion merit the confidence of the community. And, also, recommendations to the Corresponding Secretaries of this Society, in the several states where they design to labor.

Editors, friendly to the interests of Education, are respectfully requested to extend this notice, by giving it insertion in their respective periodicals.

By order of the Executive Committee.

S. R. HALL, *Chairman.*

Teachers' Seminary, Andover, March 19, 1833.

MASS. LYCEUM.

CABINETS OF NATURAL HISTORY.

AT a late meeting of the Massachusetts Lyceum several resolutions were passed for co-operating with the National Lyceum, in procuring cabinets of Natural History for all the towns and villages throughout the country, and for introducing that science as a branch of common education.

Delegates were also appointed to attend the third anniversary of the National society to be held in New York, on the third day of May next.

A vote of thanks was passed to the Bowdoin Hall School Lyceum, for their generous donation of a set of geological specimens to schools of each town in the state.

By the reports made to the society, the Lyceums in the state have increased in number and usefulness during the past year. And it is evident, that nothing is now wanting but the erection of commodious LYCEUM BUILDINGS, in our towns and villages throughout this country, to place this National and republican institution on a firm and immoveable basis.

METEOROLOGY.

METEOROLOGY OF COLUMBUS.

JANUARY.

Dys.	Therm. 7	2	9	Winds.	Weather.
1	52	54	52	SW.	Rain at times.
2	50	56	55	"	Do.
3	54	59	56	"	Cloudy.
4	51	56	54	"	Do.
5	52	57	55	"	Clear.
6	58	60	45	W'ly.	Do.
7	42	48	44	"	Do.
8	40	44	41	"	Cy. day, cl. night.
9	36	41	36	"	Cloudy.
10	8	18	25	NW.	Do.
11	3	17	15	"	Flurry of snow.
12	8	19	23	"	Do.
13	28	29	29	"	Do.
14	23	30	36	W'ly.	Fair.
15	28	29	26	"	Do.
16	23	22	20	"	Do.
17	2	18	17	SW.	Do.
18	29	30	29	NW.	Cloudy.
19	24	35	40	"	Do.
20	40	41	44	"	Fair.
21	41	48	46	W.	Rainy.
22	40	44	43	"	Cloudy.
23	32	38	36	NW.	Do.
24	33	35	31	"	Do.
25	32	38	40	"	Do.
26	41	48	40	SW.	Fair.
27	38	46	44	"	Do.
28	40	45	48	"	Do.
29	42	46	44	"	Rainy.
30	43	45	46	NW & N.	Do.
31	31	32	26	N	Fair.

FEBRUARY.

1	43	45	44	W.	Fair.
2	31	36	34	"	Do.
3	22	31	24	NW.	Do.
4	21	28	26	"	Do.
5	31	40	39	SW.	Flying Clouds.
6	32	38	28	"	Do.
7	18	33	20	"	Fair.
8	16	36	34	"	Do.
9	40	49	48	"	Do.
10	41	56	36	"	Rain at times.
11	32	35	34	S.	Rainy.
12	32	34	30	"	Do.
13	31	32	26	N.	Cloudy.
14	18	29	29	"	Do.
15	28	34	28	SW.	2 in. snow in morn.
16	31	34	30	"	Fair.
17	39	46	48	S.	Rainy.
18	42	47	42	"	Do.
19	40	45	38	SW.	Fair.
20	34	28	25	"	Do.
21	18	34	20	NW.	Cloudy.
22	28	42	44	"	Do.
23	35	44	41	SW.	Fair.
24	22	23	24	N.	Slight fall of snow.
25	8	24	22	"	Fair.
26	24	44	42	SW.	Do.
27	32	34	28	NW.	Cloudy.
28	22	24	32	"	Snow 3 inches.

Columbus High School for Young Ladies. March 9th, 1832. } H. WILCOX.

COMPARATIVE METEOROLOGY.

COLUMBUS, OHIO.

October, 1832.—Rainy, 6 days; clear, 12 days; variable, 12 days. Thermometer, max. 74 degrees on the 3d. Min. 37 degrees on the 21st.

November, 1832.—Cloudy, 10 days; rainy, 6 days; variable, 5 days; clear, 9 days. Thermometer, max. 68 degrees on the 24th. Min. 22 degrees on the 16th.

December, 1832.—Cloudy, 12 days; rainy, 6 days; variable, 7 days; clear 6 days. Thermometer, max. 54 degrees on the 5th. Min. 8 degrees on the 21st. Prevailing wind, W.

CHARLESTON, S. C.

October, 1832.—Cloudy, 10 days; rainy, 6 days; clear, 15 days. Thermometer, max, 74 degrees on the 11th, 12th, 13th, and 14th. Min 45 degrees on the 29th.

November, 1832.—Cloudy, 11 days; rainy, 2 days; clear, 18 days. Thermometer, max 70 degrees on the 7th. Min. 40 degrees on the 25th.

December, 1832.—Cloudy, 11 days; rainy, 7 days; clear 6 days; variable, 7 days. Thermometer, max. 70 degrees on the 1st. Min. 36 degrees on the 22d. Prevailing wind, N. W.

MONTREAL, LOWER CANADA.

October, 1832.—Rainy, 6 days; clear, 25 days. Thermometer, max. 60 degrees on the 18th. Min. 23 degrees on the 26th.

November, 1832.—Rainy, 5 days; clear, 24 days; snow on the 16th Thermometer, max. 52 degrees on the first. Min 12 degrees on the 15th.

CONCORD, NEW HAMPSHIRE.

December, 1832.—Cloudy, 10 days; clear, 14 days; snow and rain, 7 days. Thermometer, max. 46 degrees on the 9th. Min. 7 degrees below zero on the 10th. Prevailing wind, NW. —[*Columbus Jour.*

OXFORD LYCEUM.

WE have received the 2d and 3d numbers of a paper under the above title, recently commenced in Oxford, Ohio, under the editorship of the president or some other officers in the college in that place. The contents and general appearance of these two numbers [we hope to see the first] are certainly creditable to the editor, and give good promise for the cause of education in that place and state.

MENTAL PHILOSOPHY.

MIND AND HEART.

THE laws and powers of mind and heart, and their influence and action upon each other, present more that is curious, grand and important than any other subject beneath the sun. The mind and heart, or the intellect and affections, each possesses various powers and the powers of each are essential to the other. Feeling or affection, without intellect, could not raise a being above the brutes. And mere intellect without feeling must leave a being without moral character. The possession of both, and the disciplined, or well regulated action of one upon the other, constitute true excellence of character. The intellect discovers truth and the feelings urge the being to pursue it. The intellect distinguishes between right and wrong, and the affections lead to the pursuit of the one, and the avoiding of the other; or where the intellect is entirely under the control of the passions or feelings, the individuals may perceive the right but pursue the wrong. The intellect of the drunkard lays fully before him the evils and ruin he is bringing upon himself and his family, by pursuing his cups, and yet he may be so entirely under the control of his passions or appetites, as to suffer his intellect to have no voice in directing his steps, but in spite of her entreaties he rushes headlong to destruction, and brings poverty, wretchedness and disgrace upon a wife and children for whom he would before have been ready to sacrifice his life.

It is evident then, that a man wholly under the control of feeling, or passion, of any kind, may become a brute or a monster, a sot, a debauchee, a highway robber, a murderer, a tyrant, a public butcher of his own species.

On the other hand, if intellect is the only power called into exercise, while it may lead to much abstract truth, it will do little or nothing to embody that truth in living actions—to apply it to its uses. It may be making constant progress in unfolding the laws of the physical, the intellectual, and even the moral world, without applying one of those laws for the benefit of his fellow men. Though such a being may be a philosopher, he is a cold philosopher—an intellectual miser; hording up materials which neither himself nor any one else can use, except in the selfish and miserly reflection, that they are in his possession.

But when all the powers of the intellect, and all the feelings of the heart, are brought into a vigorous and healthy operation, the one exerting its proper influence upon the other, they indeed present a specimen of 'the noblest work of God'—a being worthy of God and himself—a character which the cold philosopher must approve and admire, though he cannot imitate; which the abandoned debauchee must respect, though he may hate. Such a character is a *christian philosopher.*

FEMALE SEMINARIES.

COLUMBUS HIGH SCHOOL.

WE have been gratified with frequent notices and accounts of the Ladies' High School at Columbus, Ohio, under the charge of Mr. Wilcox. From the prospectus and frequent notices we have seen of it, every provision is made for giving the school a high character, which it very justly sustains, with another important circumstance for the proprietors, viz. liberal patronage.

We have just been favored with a meteorological table kept at that school, which we hope will be continued, and regularly forwarded for the Lyceum.

FEMALE MODEL SCHOOL.

REV. Mr. Taylor, a teacher of great experience and skill, recently the preceptor of the Augusta, Geo. Academy, has just opened a school for young ladies in Sparta, of that state, under the most favorable auspices. The most liberal provisions in buildings, apparatus, and other facilities which money could purchase, have been made by his patrons, which they have every reason to believe will be most faithfully and skilfully applied by the teacher of their children.

CHATHAM ACADEMY.

THE Savannah, Geo. Female Seminary which has furnished many valuable favors, by tables, communications, specimens of nature, &c., is now enlarged so as to contain an apartment for gentlemen, and has nearly two hundred pupils. Being acquainted with one of the preceptors, we cannot doubt but this prosperity is richly deserved.

A meteorological table from that school will be inserted in our next.

BOOK OF NATURE.

THE MOON.

'As when the moon, refulgent lamp of night,
O'er heaven's clear azure sheds her sacred light,
Then shine the vales; the rocks in prospect rise;
A flood of glory bursts from all the skies.'

From the earth and the atmosphere we will now ascend in our speculations, and, in our way to regions more remote, turn aside a little and consider the Moon.

The first thing that strikes our attention in viewing this resplendent luminary, is the opacity of her substance, and diversity of her shades. The Moon is not, of herself, a luminary, but shines by the borrowed or reflected light of the sun, and her face, instead of being too dazzling to behold, presents, like the earth, a dark unequal surface pleasantly diversified with hills and valleys, mountains and cavities. Seas and lakes have also been exhibited as adorning this body, by the constructors of some maps of the moon; but the powerful glasses of Dr. Herschel are said to have dissipated such delusions; and, as it appears from the clearness of her disc, and the circumstance, that when any star approaches her, it retains its lustre till it touches the very edge and then vanishes in an instant, that the moon has no atmosphere, there is the less probability that there are lakes and seas, from which clouds and other atmospheric phenomena are formed.

THE PHASES OF THE MOON,

And the circumstance of her having always the same face turned to us, are very rationally accounted for as follow:—The moon is known to have a twofold motion, the one she performs round the earth in the time of a lunar month, and the other she performs round her own axis in exactly the same period. By the latter motion, she naturally behoves to turn always the same face to the earth; and by the former, her various phases are produced. When that part of the moon which is illuminated by the sun, is turned wholly towards the earth, we then see one of her sides, round and fully enlightened, and in that situation we then say that we have a *full moon;* when the side illuminated is turned from us, by being betwixt us and the sun, she becomes totally invisible, and then we have the *change;* when shortly after the enlightened part re-appears, we call it the *new moon;* and when it exhibits a half-enlightened aspect, the moon is said to be in her *first* or *last quarter*, according to the time of her age. These appearances, with all the intermediate stages, will be pretty correctly represented, by moving the bowl formerly alluded to, round the flame of a candle, when suspended by a string, and observing in what manner the light is reflected from its surface, according to the various positions in which it is placed in the course of its circuit.

ECLIPSES.

There are no phenomena better understood by modern astronomers than the nature of eclipses, and so far is there from being any thing supernatural or mysterious in them, that were the orbit of the moon perfectly parallel, or in the exact plane with that of the earth, there would be an eclipse of the moon at every full, and of the sun at every change; for there is no doubt, that an eclipse of the moon is occasioned by the dark body of the earth happening to be in a line betwixt the sun and the moon, when the moon is in a direction opposite to the sun; while an eclipse of the sun is caused by the dark body of the moon passing between the earth and the sun, when she is in that part of the heavens. That eclipses do not more frequently happen, arises from the orbit of the moon being wisely made to incline to that of the earth at a small angle; by which, although they sometimes take place, it is so unfrequent, as not exceed, at the average *four* in the year; and of these, *two* only may be expected visible at any particular place.

THE HARVEST MOON.

In the path which she describes in the heavens, the moon is made to rise every day later than she did on the preceding; but the exact period between the time of her rising differs so considerably in different seasons of the year, that although in the spring she is an hour and twenty minutes later in rising one day than she was on the preceding, the difference in autumn is so inconsiderable, as scarcely to be perceived for several days together. No sooner does the sun set, towards the middle of September, than the moon immediately rises in her glory for several days, by which the day is inconsiderably lengthened out in that most important of all seasons, and nature as it were, points to the husbandman, to make the best of his time in cutting down and securing his crops before the equinoctial gales and storms of winter set in. This wonderful phenomenon, although too little attended to by us, has been distinguished in different ages of the world by different appellations, according to the favorite occupations and pursuits in which mankind happened to be engaged at the time; being first called the Hunter's, then the Shepherd's, and now the Harvest Moon!

About the equator, where there is no variety of seasons, the moon rises with the greatest regularity, about forty-nine minutes later every day than on the preceding, but as we advance north or south from that line, and get in a more variable climate, the little difference in the rising of the Harvest Moon becomes more perceptible. At the polar circles, where the mild season is very precarious, and of short duration at that advanced season of the year, the *autumnal full-moon* rises at sun-set from the first till the third quarter; and, at the poles, where the sun is half a year below the horizon, the *winter full moon* shines constantly from the first to the third quarter!

In these respects the moon, that faithful companion and attendant on the earth, may be said to proportion her services to the emergency of the occasion: but even in the ordinary aid she affords, in the absence of sunshine, her influences are of infinite advantage. The Hebrews, the Greeks, the Romans, and indeed the ancients in general, were wont to assemble at the time of the *new-moon*, to discharge the duties of gratitude and devotion.—The oldest measure of time, taken from the revolutions of the heavenly bodies, is supposed to be a *month;* and when the king of the Pelew islands intrusted his son to the care of Captain Wilson, he inquired how many *moons* would elapse before he might expect his return.

By the dark, opaque, and unequal surface of the moon, the light of the sun is reflected to the earth, after that superb and glorious luminary has left our hemisphere to visit other climes; and what a transcendently magnificent spectacle does a moon-light scene present, independent of the incalculable blessings it is made to produce. How welcome are the harbingers of this bright luminary to the toiling traveller, when almost fainting, under his unremitting, but fruitless exertions, to gain the goal of his journey before the close of day. How comfortable to the bewildered mariner as he ploughs the deep on an unknown coast; and how cheerful to the lonely shepherd, as he tends his fleecy charge in the otherwise deep gloom of some sequestered valley, or tune his midnight pipe among the solitary tops of his native mountains. Even on the mighty ocean extends her influence; the waves of the sea are swollen and lifted up by the energy of her power; and it is far from being improbable, that what has such an effect upon this great fluid mass, may not also make some very important and sensible impressions on that atmosphere, in whose agitations and changes we are so much interested.

THE ARTS.

BEADS.

A very considerable manufacture of glass for the formation of beads is carried on at a place called Murano, situated near the city of Venice. There is nothing peculiar in the composition of the glass made use of for this purpose, nor in the methods employed for its preparation; and although the manufacturers affect great secrecy as to the coloring substances which they mix with the glass, it is not likely that they possess any real advantage over others in this respect, or that they have made any useful discovery of materials different from those commonly employed in coloring glass.

When upon inspection the colored glass is found to be in a fit state for working, the necessary quantity is gathered in the usual manner upon the rod, and is blown into a hollow form. A second workman then provides himself with an appropriate instrument, with which he takes hold of the glass at the end which is farthest from the extremity of the rod, and the two men running thereupon expeditiously in exactly opposite directions, the glass is drawn out into a pipe or tube, in the manner of those used for constructing thermometers, the thickness of which depends upon the distance by which the men separate themselves. Whatever the thickness may be, the perforation of the tube is preserved, and bears the same proportion relatively to the substance of the glass as was originally given to it by the blower. In these particulars the workmen of course govern themselves according to the size and description of the beads which are to be made. The glass-house at Murano is provided with a kind of gallery 150 feet in length, and which much resembles a rope-walk, wherein the tubes are drawn out in the manner here described.

Tubes striped with different colors are made by gathering from two or more pots lumps of different colored glass, which are united before they are drawn out to the requisite length.

As soon as they are sufficiently cool for the purpose, the tubes are divided into equal lengths, sorted according to their colors and sizes, packed in chests, and then dispatched to the city of Venice, within which the actual manufacture of the beads is conducted.

When they arrive at the bead manufactory, the tubes are again very carefully inspected, and sorted according to their different diameters, preparatory to their being cut into pieces sufficiently small for making beads.

For performing this latter operation, a sharp iron instrument is provided like a chisel, and securely fixed in a block of wood. Placing the glass tube upon the edge of this tool at the part to be separated, the workman then, with another sharp instrument in his hand, cuts, or rather chips, the pipe into pieces of the requisite size; the skill of the man being shown by the uniformity of size preserved between the different fragments.

The minute pieces thus obtained are in the next process thrown into a bowl containing a mixture of sand and wood-ashes in which they are continually stirred about until the perforations in the pieces are all filled by the sand and ashes. This provision is indispensable, in order to prevent the sides from falling together when softened by heat in the next operation.

A metallic vessel with a long handle is then provided, wherein the pieces of glass are placed, together with a further quantity of wood-ashes and sand; and the whole being subjected to heat over a charcoal fire, are continually stirred with a hatchet-shaped spatula. By this simple means the beads acquire their globular form.

When this has been imparted, and the beads are again cool, they are agitated in sieves, in order to separate the sand and ashes; this done, they are transferred to other sieves of different degrees of fineness in order to divide the beads according to their various sizes. Those of each size are then, after being strung by children upon separate threads, made up into bundles, and packed in casks for exportation.

In this manner, not fewer than sixty different kinds of glass beads are prepared in vast quantities. The principal trade in these is carried on with Spain and the coast of Africa; but some portions find their way to nearly all parts of the world.

Another and a more costly description of glass beads, made in imitation of pearls, has long been produced in France. Although the name of the inventor of these ornaments has been faithfully preserved, the period of their invention is not precisely known. Reaumur, on whose assertions the greatest reliance may generally be placed, states this to have occurred in 1656. An anecdote related by Beckmann of a cheat successfully played off upon a lady by a French nobleman, leads to the conclusion that thirty years later than the period here mentioned, these mock pearls were far from being generally introduced or even known.

The manner of their invention was this; M. Jaquin having observed that upon washing a small fish, the *Cyprinus alburnus*, or bleak, the water contained numerous fine particles, having the color of silver, and a pearly lustre, he suffered the water to stand for some time, and, collecting the sediment, covered with it some beads made of plaster of Paris, the favorable appearance of which induced him to manufacture more of the same kind for sale. These were at first eagerly adopted; but the ladies soon finding that when they were exposed to heat, the lustrous coating transferred itself from the beads to their skin, they were as quickly discarded.

The next attempt of M. Jaquin was more successful. He procured some glass tubes of a quality easily fusible, and, by means of a blowpipe, converted these into numerous hollow globules. He then proceeded to line the interior surface of these with the powdered fish-scales, which he called essence of pearl, or *essence d'Orient*. This was rendered adhesive by being mixed with a solution of isinglass, when it was introduced in a heated state inside the globules, and spread ever the whole interior surface, by shaking the beads which, for that purpose, were placed in a bowl upon the table. These hollow beads being blown exceedingly thin, in order to produce a better effect, were consequently very tender. To remedy this evil, as soon as the pearly varnish was sufficiently dry, they were filled with white wax, and being then bored through with a needle, were threaded for sale.

An expert workman can blow from five to six thousand small glass globules in a day; but, as some attention is called for in regard to the shape and appearance of these beads, the produce of a man's daily labor will not much exceed one fourth of that quantity. The closer to counterfeit nature, in their manufacture, these beads are sometimes purposely made with blemishes, and of somewhat irregular forms. Some are made pear-shaped; others are elongated like olives; and others again are flattened on one side, in imitation of natural pearls, which are set in a manner to show only one side.

The fish whose scales are put to this use are about four inches in length. They are found in great abundance in some rivers; and, being exceedingly voracious, suffer themselves to be taken without difficulty. The scales furnished by 260 of these fish will not yield more than a fourth of that quantity of the pearly powder applicable to the preparation of beads; so that 16,000 fishes are required in order to obtain only one pound of the *essence of pearl*.

Up to a recent period, the heirs of Jaquin the first inventor, carried on a considerable manufactory of these mock pearls in Paris. The fish are tolerably abundant in the river Seine; but their scales are conveyed from distant parts in much larger quantities than can be procured on the spot, for which purpose they are preserved in volatile alkali. —[*Cabinet Cyclopedia.*

COFFEE.

Coffee is the seed of a plant growing principally in Arabia and the West Indies; the flower resembles jasmine, and the leaves are evergreen; the fruit when ripe is like the cherry, it contains two cells, and each cell has a single seed, which is of a hemispherical shape. When matured, it is either gathered by the hand or shaken from the trees, and placed on mats for the sun to dry the pulpy substance which surrounds the seeds. The skin is broken by heavy rollers, and afterwards removed by winnowing.—In order to prepare the coffee for a beverage, it must be roasted till it becomes of a dark brown color and extremely odorous, after which it is ground, and either infused or boiled in water. It is remarkable for its very stimulating property, which is said to have led to its discovery. Some goats, who browsed upon this plant, were observed by the goatherd to be exceedingly wakeful, and often to caper about in the night; the prior of a neighboring monastery, wishing to keep his monks awake at their matins, tried if it would produce the same effect upon them as it was observed to do upon the goats: his success led to the appreciation of its value.—[*Lessons on Objects.*

Flying Fish.—Beyond 22° of latitude, Humbolt found the surface of the sea covered with flying-fish, which sprung into the air to a height of twelve, fifteen, and even eighteen feet, and sometimes fell upon the deck. The great size of the swimming-bladder in these animals, being two thirds the length of their body, as well as that of the pectorial fins, enable them to traverse the air a space of twenty-four feet horizontal distance before falling again into the water.—They are incessantly pursued by dolphins while under the surface, and when flying are attacked by frigate birds, and other predatory species. Yet it does not seem that they leap into the atmosphere merely to avoid their enemies; for, like swallows, they move by thousands in a straight line, and always in a direction opposite to that of the waves. The air contained in the swimming-bladder has been supposed to be pure oxigen; but Humbolt found it to consist of ninety-four parts of azote, four oxigen, and two of carbonic acid.

QUESTIONS

ON LYCEUM NO. 32.

Whose daughter was Elizabeth, Queen of England?

Who was her predecessor to the throne?

What act in the life of Elizabeth was the greatest stain upon her character?

What were the greatest defects in Elizabeth's character?

What is the structure of snow as it falls to the ground?

To what is the whiteness of snow owing?

How does snow water differ from rain water?

Is it natural for the mind to seek the cause of what it witnesses?

What substance is more universally diffused than any other, through the material universe?

Of what substances does oxigen form a part?

What portion of air is oxigen?

What other element is extensively diffused through matter?

What are some of the simple measures which never fail to improve schools?

What are the advantages of teachers' meetings?

What is the best method hitherto adopted to furnish schools with apparatus?

What other advantage may arise from contributions by pupils?

What generous offer has been made by the Bowdoin Hall School Lyceum?

What results may be expected from supplying the schools in each town in the state with a set of geological specimens?

How long has the School for the Blind been in operation?

How much and what have the pupils of that school learnt?

Who make the most rapid improvement, children in the school for the blind, or in those in our common schools?

Who has charge of a school of a superior character in Chester, N. H.?

What is a prominent feature in that school?

What was one of the first acts of benevolence performed by that school?

What are the advantages of simultaneous efforts?

Into what two principles may every thing relating to mechanics be resolved?

Upon what principle are falling bodies accelerated in their motion?